

REMARKS

Claims 11-20 are pending in this application. In view of the following remarks, reconsideration and allowance of the claims are respectfully requested.

I. Rejections Under 35 U.S.C. §103**A. Landsman, Yao and Hodgdon**

The Office Action rejects claims 11-13, 15-19 and 20 under 35 U.S.C. §103(a) over U.S. Patent No. 5,480,735 to Landsman et al. ("Landsman") in view of U.S. Patent No. 6,183,914 to Yao et al. ("Yao") and U.S. Patent No. 5,118,717 to Hodgdon et al. ("Hodgdon"). Applicants respectfully traverse the rejection.

Claim 11 recites, "Alkali fuel cell comprising a solid stack consisting of a first electrode, a hydroxide ion conducting solid membrane, and a second electrode, wherein, each electrode comprises an active layer that is in contact with the solid membrane, the material forming the active layer of each electrode comprises at least a catalytic element, an electronic conductive element and an element conducting hydroxide ions, the element conducting hydroxide ions of the active layer of each of the electrodes being a polymer having vinylaromatic units comprising a quaternary ammonium function and hydroxide counter-ions OH⁻ being associated with the quaternary ammonium functions of the polymer, and the fuel cell not comprising any alkaline liquid." (Emphasis added). Applicants respectfully assert that the applied references would not have rendered obvious each and every feature of claim 11.

Claim 11 requires that the active layer on each electrode comprises three elements: 1) a catalytic element; 2) an electronic conductive element; and 3) an element conducting hydroxide ions. Thus, the alkali fuel cell of claim 11 has the element conducting hydroxide ions in each active layer of each electrode. This provides active layers that form triple point zones, where an ionic conduction, an electronic conduction and a catalytic reaction all take

place, without needing to add an alkaline liquid to the fuel cell. See specification, page 6, lines 24-27. Therefore, the solid membrane of the solid stack recited in claim 11 may be chosen from any known solid membrane that is able to conduct hydroxide ions. See specification, page 6, lines 12-14. Applicants respectfully assert that the applied references fail to recognize the benefits of the active layer recited in claim 11 (i.e., an active layer in each electrode that forms triple point zones) and, thus, the applied references and the Office Action fail to provide any reason or rationale for one of ordinary skill in the art to have modified the fuel cell of Landsman to have included 1) a catalytic element; 2) an electronic conductive element; and 3) an element conducting hydroxide ions in an active layer on each electrode, for at least the below reasons.

Landsman merely discloses a fuel cell with catalyst layers on its anode and cathode, where the catalyst layers face a matrix containing an alkaline electrolyte. See Landsman, col. 1, lines 21-25. The matrix containing the alkaline electrolyte allows the flow of ions through the electrolyte to complete a circuit. See Landsman, col. 1, lines 47-48. Thus, the only element that conducts hydroxide ions in Landsman is the alkaline electrolyte, which is present in a matrix between the two electrodes. Therefore, Landsman fails to disclose an active layer of each electrode that comprises an element conducting hydroxide ions, as recited in claim 11.

Yao merely discloses a "film that is suitable for use as an ion-conducting ... membrane in a power source, such as for example an alkaline battery or fuel cell, that relies on hydroxide anion transport for its operation." Yao, abstract. Thus, Yao merely discloses a film that may allegedly be used in place of the matrix-alkaline electrolyte layer of Landsman. However, nowhere does Yao, Landsman or the Office Action provide any reason or rationale for one of ordinary skill in the art to have been apprised that the film of Yao can or should be used in an active layer of each electrode. Therefore, it would not have been obvious to one of

ordinary skill in the art to have modified the fuel cell of Landsman to have included the film disclosed in Yao in either, let alone both, of its electrodes. Also, the Office Action merely asserts, "It would have been obvious to one of ordinary skill in the art at the time of the invention to use a solid electrolyte membrane to replace the alkaline liquid electrolyte of Landsman" Office Action, page 3. Therefore, the Office Action even concedes that it only would have been obvious to have replaced the alkaline electrolyte of Landsman with the film of Yao. The Office Action does not assert that the film of Yao can or should be added to either of the electrodes disclosed in Landsman. Thus, even if Landsman and Yao were to have been combined, as asserted in the Office Action, the combination would not have yielded the fuel cell as recited in claim 11 at least because the combination would not have resulted in each electrode having an active layer comprising 1) a catalytic element; 2) an electronic conductive element; and 3) an element conducting hydroxide ions.

Hodgdon merely discloses specific monomers that have anion exchange groups, but Hodgdon does not disclose that this monomer can or should be used in an electrode. Thus, Applicants respectfully assert that if one of ordinary skill in the art were to have modified the fuel cell of Landsman with the monomer disclosed in Hodgdon, he or she would have merely placed Hodgdon's monomer in the electrolyte layer and not in an active layer of either, let alone both, of the electrodes. Therefore, Hodgdon also fails to provide any reason or rationale for one of ordinary skill in the art to have included an element conducting hydroxide ions in an active layer on each electrode.

For at least the above reasons, Applicants respectfully assert that neither the Office Action nor the applied references provide any reason or rationale for one of ordinary skill in the art to have modified the disclosure of Landsman to include an active layer on each electrode that comprises 1) a catalytic element; 2) an electronic conductive element; and 3) an element conducting hydroxide ions in an active layer on each electrode.

Further, Applicants assert it would not have been obvious to one of ordinary skill in the art to have known how the incorporation of the specific polymer recited in claim 11 would have reacted when incorporated with the other two elements required to be present in the active layer of the electrodes. Specifically, it would not have been obvious to one of ordinary skill to have known that the specific polymer recited in claim 11 would not have adversely affected the functions of the other elements.

In addition, the Office Action, on page 4, asserts that "it would have been obvious to one of ordinary skill in the art to incorporate the anion exchange membrane to conduct hydroxide ions in the electrode of Landsman modified by Yao, because Hodgdon teaches the anion exchange membrane is resistant to caustic degradation and organic fouling." However, this assertion does not provide any reason or rationale for one of ordinary skill in the art to have included the anion exchange membrane in the active layer of an electrode, as recited in claim 11. Also, Hodgdon is not directed to an alkaline fuel cell and, thus Hodgdon does not consider the carbonation phenomenon caused by the formation of potassium carbonate, which is specifically detrimental in alkaline fuel cells. The potassium carbonation problem of alkaline fuel cells can not be compared to caustic degradation or organic fouling and, thus, one of ordinary skill in the art would not have expected that the specific combination of 1) a catalytic element; 2) an electronic conductive element; and 3) an element conducting hydroxide ions in an active layer on each electrode as recited in claim 11 would have reduced the problems associated with potassium carbonation in alkaline fuel cells.

For at least the above reasons, Applicants respectfully assert that Landsman, Yao and Hodgdon would not have rendered obvious each and every feature of claim 11. The remaining claims variously depend from claim 11 and likewise would not have been rendered obvious. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

B. Landsman, Yao, Hodgdon and Yokoyama

The Office Action rejects claim 14 under 35 U.S.C. §103(a) over Landsman in view of Yao and Hodgdon and further in view of U.S. Patent No. 4,374,924 to Yokoyama et al. ("Yokoyama"). Applicants respectfully traverse the rejection.

For at least the reasons stated above, claim 11 would not have been rendered obvious by Landsman, Yao and Hodgdon. Further, Yokoyama is not applied to address the above discrepancies of Landsman, Yao and Hodgdon as to claim 11. Therefore, Landsman, Yao, Hodgdon and Yokoyama, as applied in the Office Action, would not have rendered obvious each and every feature of claim 11.

Claim 11 would not have been rendered obvious by Landsman, Yao, Hodgdon and Yokoyama, as applied in the Office Action. Claim 14 variously depends from claim 11 and likewise would not have been rendered obvious. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

II. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the claims are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Date: December 22, 2009

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